

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

1. (Currently amended): A storage device comprising:

a control unit;

a cache memory; and

a disk device;

wherein said control unit records access history information that identifies a data access pattern and a history of data readout activity having been performed ~~for-by~~ the disk device ~~by each computer among~~ for a plurality of computers classified into a plurality of groups and connected to said storage device, each of said plurality of groups being assigned a respective group identifier, respectively reading out data from said storage device to specify ~~one of said~~ computers in a first group of computers based on predetermined information including both a first information for specifying the access history and a second information including the group identifier for the first group of computers, ~~indicating the specified computer~~, pre-reads data to be used by said ~~one of said first group of~~ computers from said disk device to said cache memory based on a one or more commands containing information for specifying said history and information for specifying ~~said one of said the first group of~~ computers, the one or more commands being received from a management computer communicating with the storage device through a network;

determines data to be pre-read in accordance with ~~said the~~ data access patterns and ~~said history of data readout activity of said first group of computers; and of said one of said~~ computers; and

wherein the control unit records information on said history, in a form of a table specifying a relationship among a history identifier, the data readout location, and at least one of said first group of computers accessing data stored at the data readout location, into a

predetermined unit for controlling the cache memory, as being linked with said information for specifying said history and said information for specifying said at least one of said first group of computers, and reads data from said disk device to said cache memory, based on said history linked with said information for ~~specifying said each specified computer~~ in the first group of computers and said information for specifying said history contained in said one or more commands in response to receiving said one or more commands from the management computer, the management computer being arranged to include a display screen on which information on the plurality of groups and the plurality of computers classified into said plurality of groups is displayed.

2. (canceled)

3. (Previously presented) A storage device according to claim 1, wherein said predetermined information includes information on time, and said control unit records said history as being linked with information for specifying said history and information for specifying said computer until a predetermined time.

4. (Currently amended) A storage device according to claim 3, wherein said predetermined information includes information for specifying a data storage location of said disk device, and said control unit records said history as being linked with said information for specifying said history and said information for specifying said computer from a time when one or more computers in said first group of computers ~~specified by said information for specifying said computer~~ reads out data stored at a data storage location of said specified disk device.

5. (Original) A storage device according to claim 4, wherein when a command of stopping record of said history is received, the record of said history is stopped.

6. (canceled)

7. (Currently amended) A storage device according to claim 4, wherein an operating system program to be used by one or more of said specified computers is stored in a location specified by the information for specifying the data storage location of said disk device.

8. (Currently amended) A storage device according to claim 5, wherein an operating system program to be used by one or more of said specified computers is stored in a location specified by the information for specifying the data storage location of said disk device.

9. (Original) A storage device according to claim 1, wherein the history is arranged to be recorded in a form of a table specifying a relationship among a history ID, the data readout location and the computer using the data having been stored in the location.

10. (Currently amended) A system including a storage device having a disk device and a cache memory, a management computer, and a plurality of computers connected to said storage device and classified into a plurality of groups, comprising:

said management computer for transmitting to said storage device a first command containing information for specifying any one of said computers in a first group of computers and information for specifying access history information that identifies a data access pattern and a history of data readout activity for said specified computers in said first group and said storage device;

said storage device for, when a computer in said first group of computers specified by said first command reads out data from said storage device, reading a storage location of said data in said disk device as a history that is linked with information for specifying said access history information and information about said computer to be specified contained in said first command;

said management computer for transmitting to said storage device a second command containing information for specifying any one of said computers in said first group of computers ~~plurality of computers~~ and information for specifying said access history information; and

18 said storage device for reading out data specified by said access history
19 information from said disk device to said cache memory, based on said second command
20 received from said management computer, said pre-read data being determined in accordance
21 with said access history information of said one of said computers in said first group of
22 computers.

1 11. (Previously presented) A system according to claim 10, wherein said
2 management computer includes information about a schedule of a designation to be transmitted
3 to said storage device by said computer itself, and said management computer transmits said first
4 command or second command to said storage device based on said schedule.

1 12. (Original) A system according to claim 10, wherein said management
2 computer designates said specified computer to start said specified computer itself after said
3 second command is transmitted to said storage device.

1 13. (Currently amended) A read-ahead method to be executed in a storage
2 device, comprising the steps of:

3 in a management computer:

4 transmitting to said storage device ~~a first one or more first commands~~
5 containing information for specifying a first group of computers from among a plurality of
6 computers connected to said storage device, the first group of computers being specified
7 according to a group identifier, and access history information that identifies a data access
8 pattern and a history of readout activity ~~having been performed for the storage device by said~~
9 ~~first computer to be~~ for different ones of said first group of computers, said access history
10 information used by said storage device to perform said read-ahead;

11 in said storage device,

12 recording a location where data associated with said ~~first one or more first~~
13 ~~commands~~ is to be stored and linked with information for specifying said access history
14 information and information for specifying said first group of computers when computers in said
15 first group of computers reads out said data from said storage device; and

16 in said management computer:

17 transmitting ~~a one or more~~ second commands containing information for
18 specifying one of said first group of computers and information for specifying ~~said access history~~
19 information for use with said one of said first group of computers to said storage device;

20 in said storage device,

21 pre-reading data from a recording medium included in said storage device
22 based on said recorded access history information corresponding with said information for
23 specifying said one of said first group of computers and said information for specifying said
24 history contained in said second command.

1 14. (Previously presented) A read-ahead method according to claim 13,
2 further comprising the steps of:

3 transmitting information about time to said storage device; and

4 recording said history until the time specified by said information about time in
5 said storage device.

1 15. (Previously presented) A read-ahead method according to claim 13,
2 further comprising the step of:

3 recording said history from a time specified by said information about
4 time in said storage device, based on said information about time.

1 16. (Currently amended) A system according to claim 10, wherein said
2 management computer classifies said plurality of computers into ~~a said~~ plurality of groups when
3 registering said computers.

1 17. (Currently amended) A storage system comprising:
2 a plurality of computers classified into a plurality of groups; and
3 a storage device in data communication with each of said computers, said storage
4 device comprising:

5 a plurality of disk drive units;

6 a cache memory for storing portions of data stored on said disk drive units
7 that are read out from said disk drive units; and
8 a control unit for controlling reading out of data stored on said disk drive
9 units,
10 said control unit configured to:
11 obtain storage-device-access history information that identifies an access
12 pattern and a history of data readout activity for ~~each of said~~ each of a first group of
13 computers in said plurality of computers based upon information from a management
14 computer;
15 store information in tabular form which identifies each of said computers
16 in said first group with their ~~its~~-respective storage-device-access history information; and
17 pre-read data from said disk drive units for at least one of said computers
18 of said first group based on its respective storage-device-access history information.

1 18. (Previously presented) The storage device according to claim 1, wherein
2 the second information comprises a MAC (Media Access Control) address.

1 19. (Previously presented) The storage device according to claim 1, wherein
2 the command comprises a PointRead-command for instructing the storage device to start a pre-
3 read operation to be performed by the control unit in response to a predetermined condition
4 having been defined in advance for starting the pre-read operation.

1 20. (Currently amended) A storage device comprising:
2 a control unit;
3 a cache memory; and
4 a disk device;
5 wherein said control unit:
6 records access history information that identifies a data access pattern and
7 a history of data readout activity having been performed ~~for by~~ the disk device ~~by for~~
8 each computer among a plurality of computers classified into a plurality of groups and

9 connected to said storage device, each of said plurality of groups being assigned a
10 respective group identifier, respectively reading out data from said storage device to
11 specify ~~one of said computers in a first group of computers~~ based on predetermined
12 information including both a first information for specifying the access history
13 information and a second information ~~having a including~~ MAC (Media Access Control)
14 addresses for the first group of computers; specifying the computer,

15 pre-reads data to be used by said first group of one of said computers from
16 said disk device to said cache memory based on one or more a commands containing
17 information for specifying said access history information and information for specifying
18 the first group of computers, one of the computers; the one or more commands being sent
19 from a management computer communicating with the storage device through a network
20 and ~~being a including~~ PointRead-commands for instructing the storage device to start a
21 pre-read operation to be performed by the control unit in response to a predetermined
22 condition having been defined in advance for starting the pre-read operation, and

23 determines data to be pre-read in accordance with said access history
24 information of data readout activity of said first group of computers; and of said one of
25 said computer; and

26 wherein the control unit further:

27 records said access history information in the form of a table specifying a
28 relationship among a history identifier, the data readout location, and at least one of said
29 first group of computers accessing the data stored at the data readout location, into a
30 predetermined unit for controlling the cache memory, as being linked with said
31 information for specifying said history of data readout activity and said information for
32 specifying said at least one of said first group of computers, and

33 reads data from said disk device to said cache memory based on said
34 access history information linked with said information for specifying said each specified
35 computer and said information for specifying said history of data readout activity
36 contained in said one or more commands in response to receiving said one or more
37 commands from the management computer, the management computer being arranged to

38 include a display screen on which information on the plurality of groups and the plurality
39 of computers classified into said plurality of groups is displayed.

1 21. (Currently amended) A storage system comprising:

2 a storage device including:

3 a control unit;

4 a cache memory; and

5 a disk device;

6 a plurality of computers respectively connected to the storage device through a
7 network for performing any program having been stored in the storage device;

8 a management computer connected to the storage device through the network for
9 classifying said plurality of computers into a plurality of groups and sending one of a plurality of
10 commands to the storage device;

11 wherein the control unit is provided within the storage device such that the control
12 unit:

13 records access history information that identifies a data access pattern and
14 a history of data readout activity having been performed ~~for by the disk device by for~~
15 each computer in a first group of computers, among the a plurality of computers
16 respectively reading out data from the storage device to specify one of the computers in
17 said first group based on predetermined information including both a first information for
18 specifying the access history information and a second information having a including
19 MAC (Media Access Control) addresses for said specified computers of said first group;
20 specifying the computer;

21 pre-reads data to be used by ~~the one of the said first group of computers~~
22 from the disk device to the cache memory based on a one or more commands containing
23 information for specifying the access history information and information for specifying
24 computers belonging to the first group of computers the one of the computers, the one or
25 more commands being sent from the management computer and ~~being including a~~
26 PointRead-commands for instructing the storage device to start a pre-read operation to be

performed by the control unit in response to a predetermined condition having been defined in advance for starting the pre-read operation;

determines data to be pre-read in accordance with the history of data readout activity of the first group of one of the computers;

and wherein the control unit (102):

records the access history information in a form of a table specifying a relationship among a history identifier, the data readout location, and at least one of said first group of computers accessing the data stored at the data readout location into a predetermined unit for controlling the cache memory, as being linked with the information for specifying the history of data readout activity and the information for specifying said at least one of said first group of computers; and the computer; and

reads data from the disk device to the cache memory based on the access history information linked with the information for specifying the each specified computer and the information for specifying the history of data readout activity contained in the one or more commands in response to receiving said one or more commands from the management computer, the management computer being arranged to include a display screen on which information on the plurality of groups and the plurality of computers classified into said plurality of groups is displayed.

22. (New) A control unit adapted to be positioned in a storage device including a cache memory and a disk device with a plurality of disk-shaped storage for controlling the storage device:

wherein said control unit:

records a data readout location in the disk device as a history of data readout activity having been performed for the disk device by each computer among a plurality of computers to be classified into a plurality of groups respectively assigned an identifier connected to said storage device, respectively reading out data from said storage device to specify one of said computers based on a predetermined information including both a first information for

specifying the history and a second information having the identifier assigned to each of the plurality of groups for specifying the computer;

pre-reads data to be used by said one of said computers from said disk device to said cache memory based on a command containing information for specifying said history and information for specifying said one of said computers, the command being sent from an outer device of the storage device;

determines data to be pre-read in accordance with said history of data readout activity of said one of said computer;

and wherein the control unit :

records information on said history, in a form of a table specifying a relationship among a history ID, the data readout location and the computer using the data having been stored in the location, into a predetermined unit for controlling the cache memory, as being linked with said information for specifying said history and said information for specifying said computer; and

reads data from said disk device to said cache memory, based on said history linked with said information for specifying said computer and said information for specifying said history contained in said command in response to receiving said command from the management computer, the management computer being arranged to include a display screen on which information on the plurality of computers having been classified is displayed.

23. (New) A storage device comprising:

control unit;

a cache memory; and

a disk device with a plurality of disk-shaped storage;

wherein said control unit:

records a data readout location in the disk device as a history of data readout activity having been performed for the disk device by each computer among a plurality of computers to be classified into a plurality of groups respectively assigned an identifier connected to said storage device, respectively reading out data from said storage device to specify one of

10 said computers based on a predetermined information including both a first information on time
11 for specifying the history and a second information having both the identifier assigned to each of
12 the plurality of groups and a data storage location for specifying the computer;

13 pre-reads data to be used by said one of said computers from said disk device to
14 said cache memory based on a command containing information for specifying said history and
15 information for specifying said one of said computers, the command being sent from an outer
16 device of the storage device;

17 determines data to be pre-read in accordance with said history of data readout
18 activity of said one of said computer;

19 and wherein the control unit:

20 records information on said history, in a form of a table specifying a relationship
21 among a history ID, the data readout location and the computer using the data having been stored
22 in the location, into a predetermined unit for controlling the cache memory, as being linked with
23 said information for specifying said history and said information for specifying said computer;
24 and

25 reads data from said disk device to said cache memory, based on said history
26 linked with said information for specifying said computer and said information for specifying
27 said history contained in said command in response to receiving said command from the
28 management computer, the management computer being arranged to include a display screen on
29 which information on the plurality of computers having been classified is displayed.